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AN APPRAISAL OF TWO METHODS OF PREDICTING POTATO BLIGHT IN 1985

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SUMMARY

Predictions of potato blight outbreaks using two weather based methods are compared with actual outbreak dates. The two methods seem to be complementary. Warnings based on Smith Periods are the better in the early part of the season but later in the season the second, 'Generation Counting', method is preferable.

INTRODUCTION

Two systems are currently used by MAFF to assist in the prediction of outbreaks of potato blight. The first system uses the well known Smith Periods. The second system is based on a method of estimating when weather conditions are suitable for the rapid growth of successive generations of the disease, starting with the assumption that innoculum is present early in the season. This second system was devised by Sparks (1984a, b) and was first used in 1984; Wass (1984) compared the two systems in that year and concluded that the performance of the new system was encouraging. The purpose of this note is to see how the systems performed in 1985.

THE TWO SYSTEMS

The starting date for counting Smith Periods (SPs) is an important uncertainty of the method; information on the occurrence of SPs is supplied to MAFF from 1st of May but when serious consideration is given to them is decided by plant pathologists in the light of experience. Ideally the SP system gives 7-21 days warning of an outbreak within the area for which the weather data is representative. In practice the timing of outbreaks is less precise and counts of the number of SPs is often taken as a broad indicator of the relative risks in various areas.

The 'Generation Counting' (GC) method of the second system has been shown to give, at least in the Eastern Region, warning of an outbreak some two weeks after the completion of the second generation of the disease (Sparks, 1984b). The performance of this system elsewhere in the country suggests that the warning period is more variable and, again, the system can be used in a less precise manner by counting the number of generations since 1st May. The completion of three generations can be regarded as indicating an outbreak is imminent in the area.

With the GC method the date on which the figures should start to be seriously considered is less critical because the method is (a) not simply cumulative and (b) flexible in that the stage of crop development can be considered - a sparse or dense crop canopy.

Generation counting started on 1st May for both early and maincrop varieties; early crops had emerged by then but for maincrops that date may be rather premature - by perhaps a week. In this season the effect of this premature starting date was small because first generations were initiated by weather conditions in the first week of May at only very few sites (Valley (Anglesey), Hemsby (Norfolk coast) and Manston (Kent coast)).

In 1985 the regional weekly disease reports (received by the Plant Pathology Department at Bristol) indicated that the date of closure was early to mid-June for early potatoes and mid to end June for maincrops. Dates of 10 and 25 June respectively have therefore been used as being representative and used to mark the changeover from calculation for a sparse crop to calculation for a dense crop.

COMMENTARY ON THE 1985 SEASON

Figures 1a to 1k show, on a weekly basis:

(a) the cumulative numbers of SPs;

(b) areas where the GC (generation count) was three or more;

(c) the sites of outbreaks (as reported in regional weekly disease reports sent to the Plant Pathology Department at Bristol). Outbreaks in dumps and irrigated crops are not shown.

Situation by week ending (w/e) 13 May - Fig 1a

(SP = Smith Period, GC = Generation Count)

No SPs.
First generation recorded in coastal Kent + Norfolk.

Situation by w/e 20 May - Fig 1b

SPs on coasts of Devon and SW Dyfed.
First generation reached in coastal N and Central Wales.

Situation by w/e 27 May - Fig 1c

Several SPs on coasts of Devon and SW Dyfed. SPs recorded over large areas of SW and E England, none in N and Central England.

Large area of E and Central England recording first generation. Two generations in coastal Kent.

Situation by w/e 3 June - Fig 1d

No change in pattern of SPs or GCs.

Situation by w/e 10 June - Fig 1e

All of N and Central England continue to record no SPs; small increases elsewhere.

GCs now mainly 1-2 at most sites except zero in S Devon and Dorset. Three generations in Anglesey, Kent and Norfolk - although this count may be premature and should be two rather than three.

The first confirmed outbreak in earlies on the Gower was reported in w/e 7 June. Two near-by stations had recorded their first SPs some eleven to eighteen days earlier (by w/e 20 May - Fig 1b); the Gower area was also associated with a large number (2 - 4) of SPs by 10 June. Thus the SP system gave a good warning in both general terms and in terms of timing.

The GC system gave no warning.

Situation by w/e 17 June - Fig 1f

No change to pattern of SPs.

GCs increased at some sites; the area with GC ≥ 3 increased slightly (Stansted).

Outbreaks in earlies observed in E Kent and Wales. The former was well indicated by the GC (of 4) and equally well by the SP system - the first SP was recorded some 14 days earlier. The outbreaks in Wales were in areas with a variable number of SPs (1 to 4) and a GC of 2 - a moderate indication from both systems.

Situation by w/e 24 June - Fig 1g

Number of SPs increased but there remains a band from N England to N Dorset which has markedly fewer (in some cases none) than elsewhere.

The area with $\geqslant 3$ GCs increased further.

Outbreaks were observed in the Fens and around the Wash. SPs were typically 2 to 3 (with the first being recorded about four weeks previously) and GCs had only just risen to 2. The GC system thus gave no advance warning and any warning deduced from the SP system was premature.

Situation by w/e 1 July - Fig 1h

Numbers of SPs increased at stations in the South-West but were unchanged elsewhere, in particular the sparse area from N England to N Dorset remains.

The area with GC $\geqslant 3$ covers most of the country.

There were further outbreaks in E England - in the area still with 2-3 SPs (the first of which were recorded about five weeks previously); however the GC had risen to $\geqslant 3$ - suggesting imminent outbreaks.

Situation by w/e 8 July - Fig 1i

Little change to the SP or GC pattern.

The outbreaks in Shropshire and Cheshire, with SPs of 0 and 0 to 1 respectively are poorly indicated by the SP system. On the GC system these areas had been at risk of an imminent outbreak for the previous two weeks approximately.

Situation by w/e 15 July - Fig 1j

Little change to the SP pattern.

GCs increased to bring the N Midlands into the risk area.

Outbreaks were observed in, amongst many other places, Shropshire (again) where the SP count remained zero.

Situation by w/e 22 July - Fig 1k

There were many outbreaks in areas where SP was 0 to 1 but which had been declared at risk for several weeks on the GC system.

DISCUSSION

The first confirmed outbreak of blight was fairly well indicated by the SP system but not by the GC system. The next outbreaks in E Kent and Wales were moderately well indicated by both systems. Of subsequent outbreaks the most noteable were those in the Midlands in areas which (a) had few (0 to 1) SPs but (b) were (and had been for 2-3 weeks) at risk of imminent outbreak on the GC system.

This pattern suggests that the SP system provides the more reliable warning of the first outbreak of the season.

Warnings of subsequent outbreaks were of mixed quality with no system showing particular advantage. Later outbreaks occurred in areas where the SP count was 0 or 1 - giving no useful warning whereas the areas were at risk on the GC system (although by the end of July the areas had been at risk for several weeks). This feature was noticed in the previous year (Wass, 1984).

Overall, the SP system is best for early outbreaks whereas later outbreaks are best indicated by the GC system.

Thus, based on the evidence of the past two seasons, to obtain the best possible warning system it is necessary to maintain the two systems running together with the emphasis on Smith Periods early in the season and on Generation Counts later in the season.

REFERENCES

Sparks, W.R.	1984a	The definition of a new critical period for potato blight prediction. Agricultural Memorandum No 1019
Sparks, W.R.	1984b	The use of 'critical' weather periods in the prediction of potato blight outbreaks. Agricultural Memorandum No 1020
Wass, S.N.	1984	An appraisal of two methods for predicting potato blight in 1984. Agricultural Memorandum No 1038

KEYWORDS

Potato Blight, Weather.

Any comments or suggestions on this paper should be referred to the author.

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Fig 1b
w/e 20 May '85

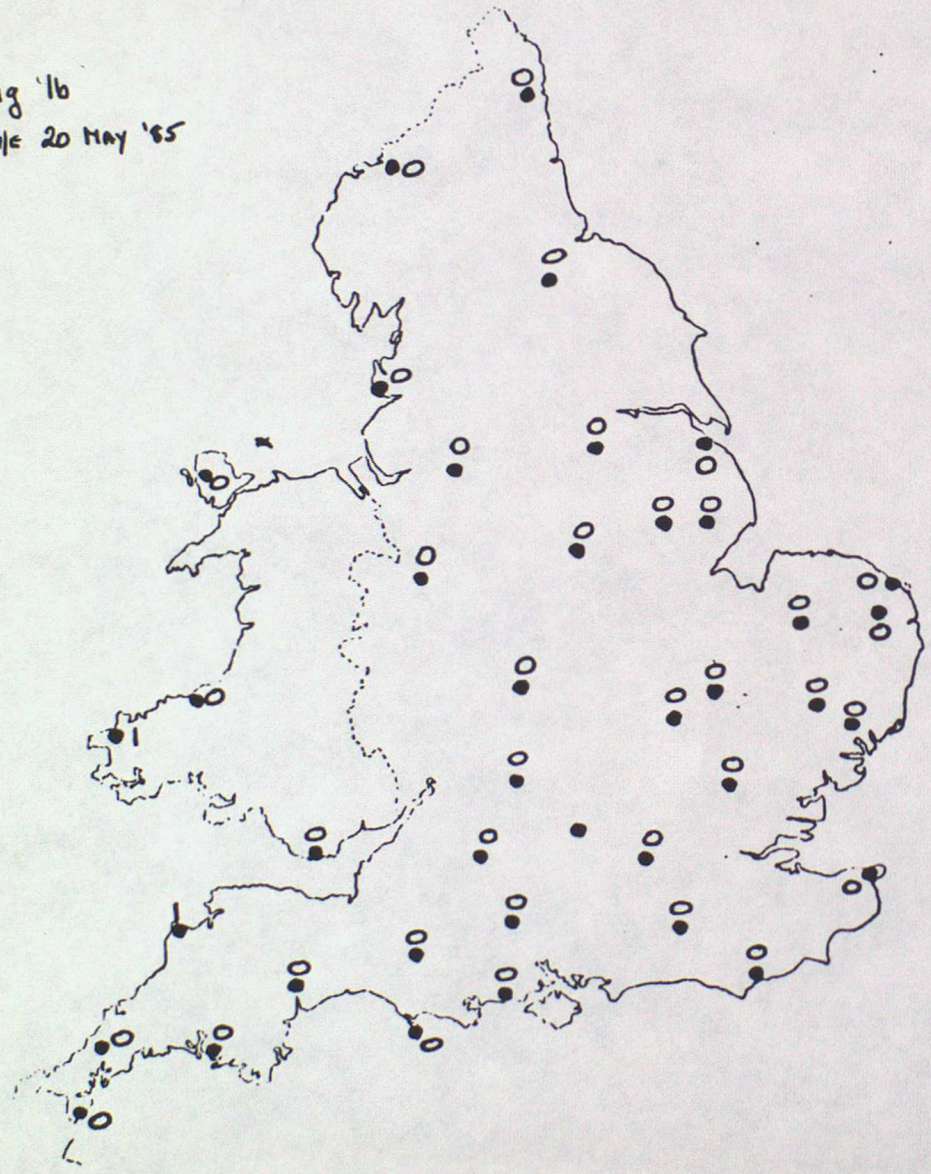

Fig 1c
w/e 27 May '85

KEY TO FIGURE 1

2 ← NO OF SMITH PERIODS

● ← OBSERVING SITE

AREA WITH GC<3 | AREA WITH GC ≥3

E = Confirmed outbreak in earlies

M = Confirmed outbreak in maincrops

Fig 1a

w/e 13 MAY '85

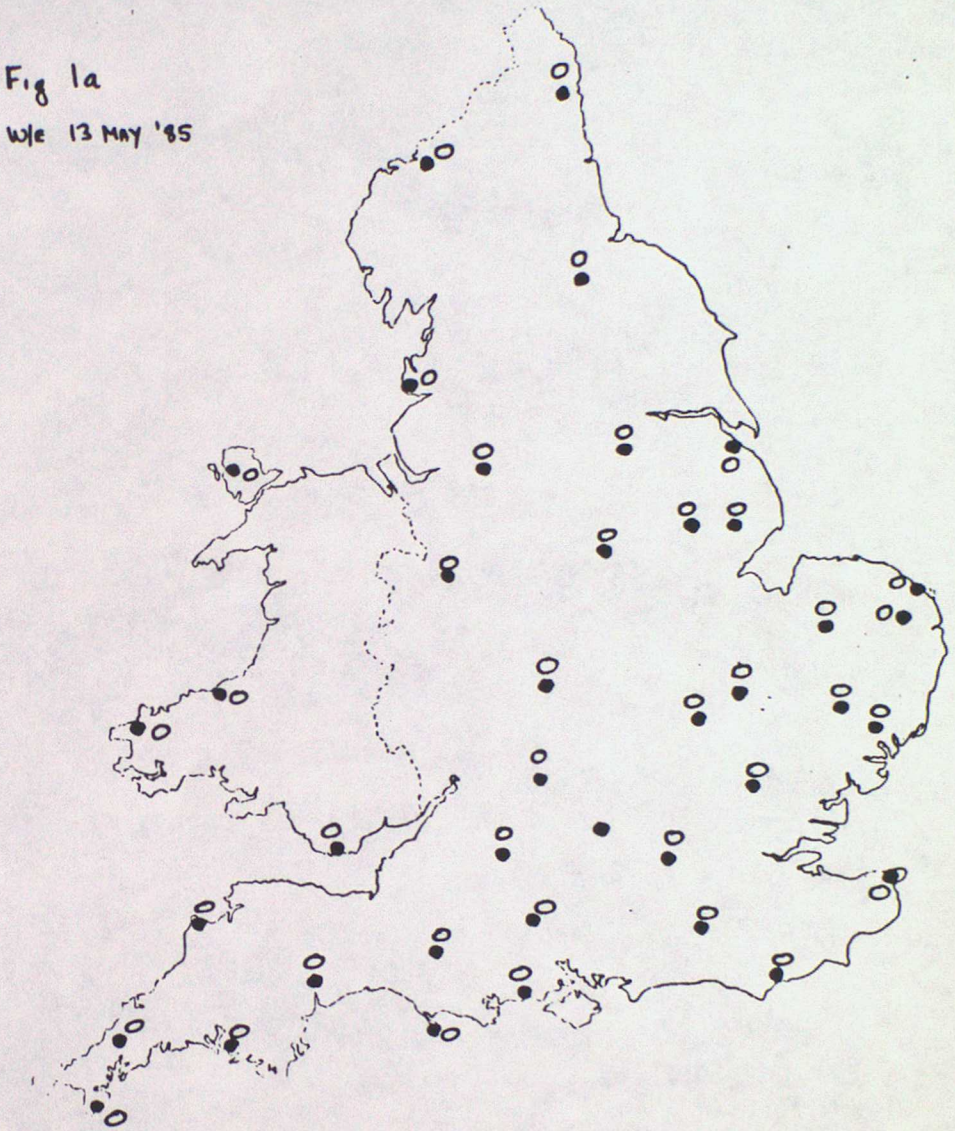

Fig 1d
w/e 3 June '85

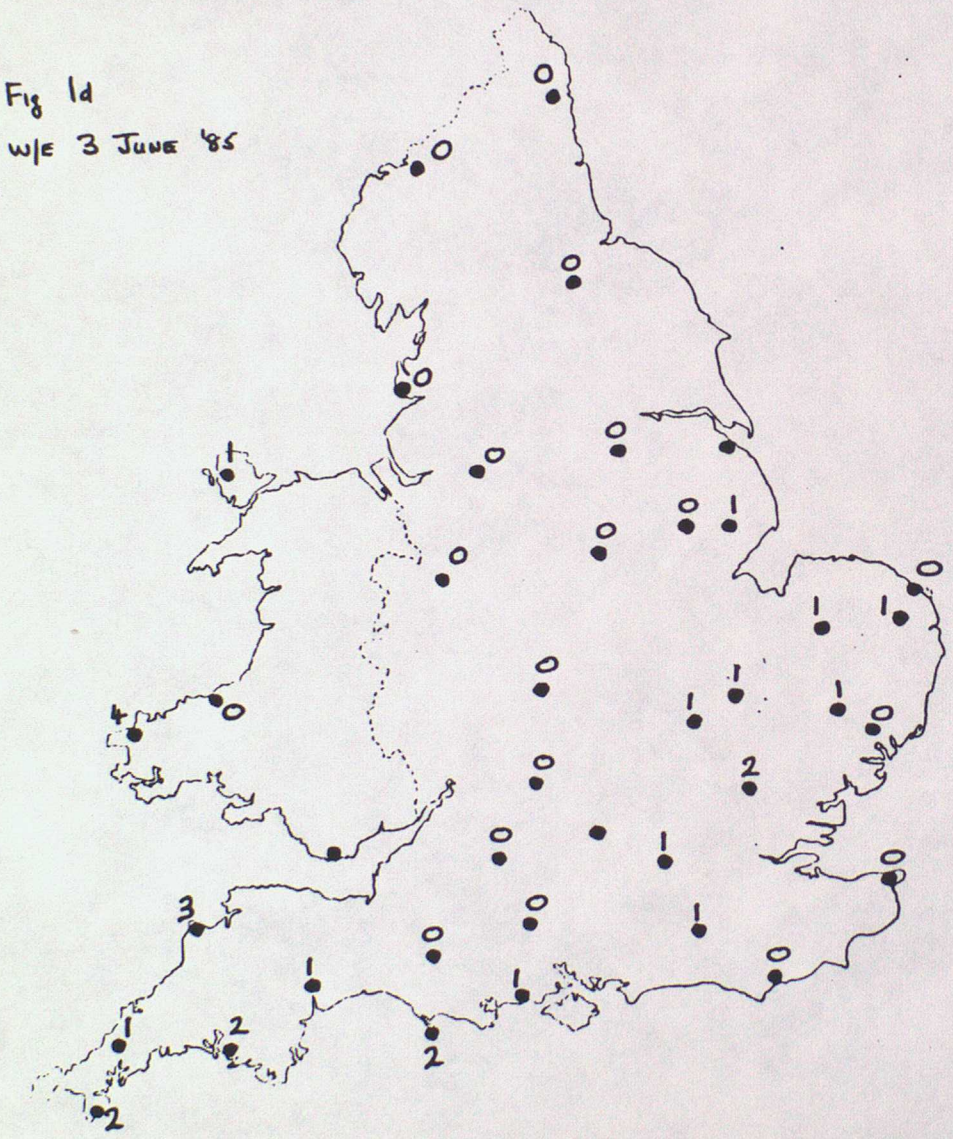

Fig 1e
w/e 10 June '85

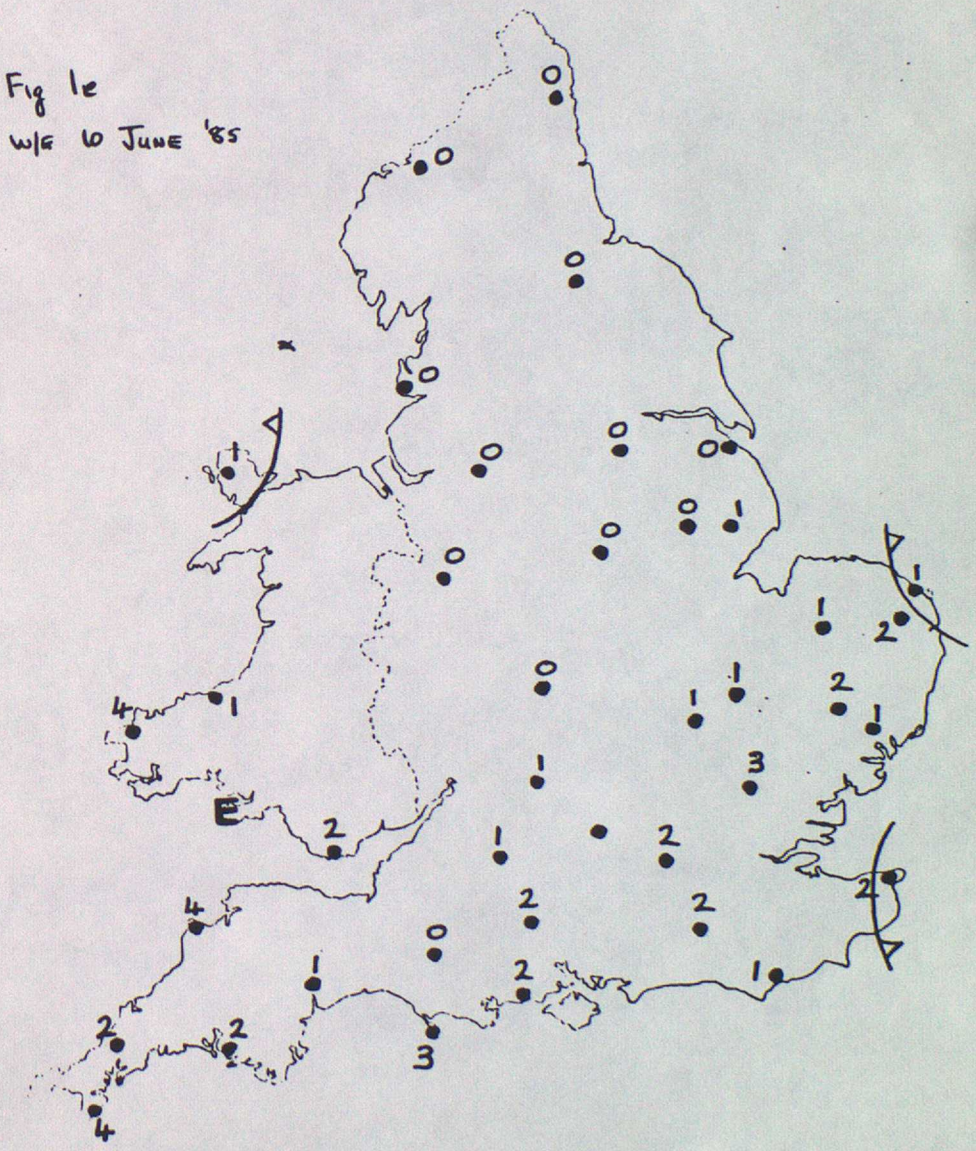

Fig 1f
W/E 17 June '85

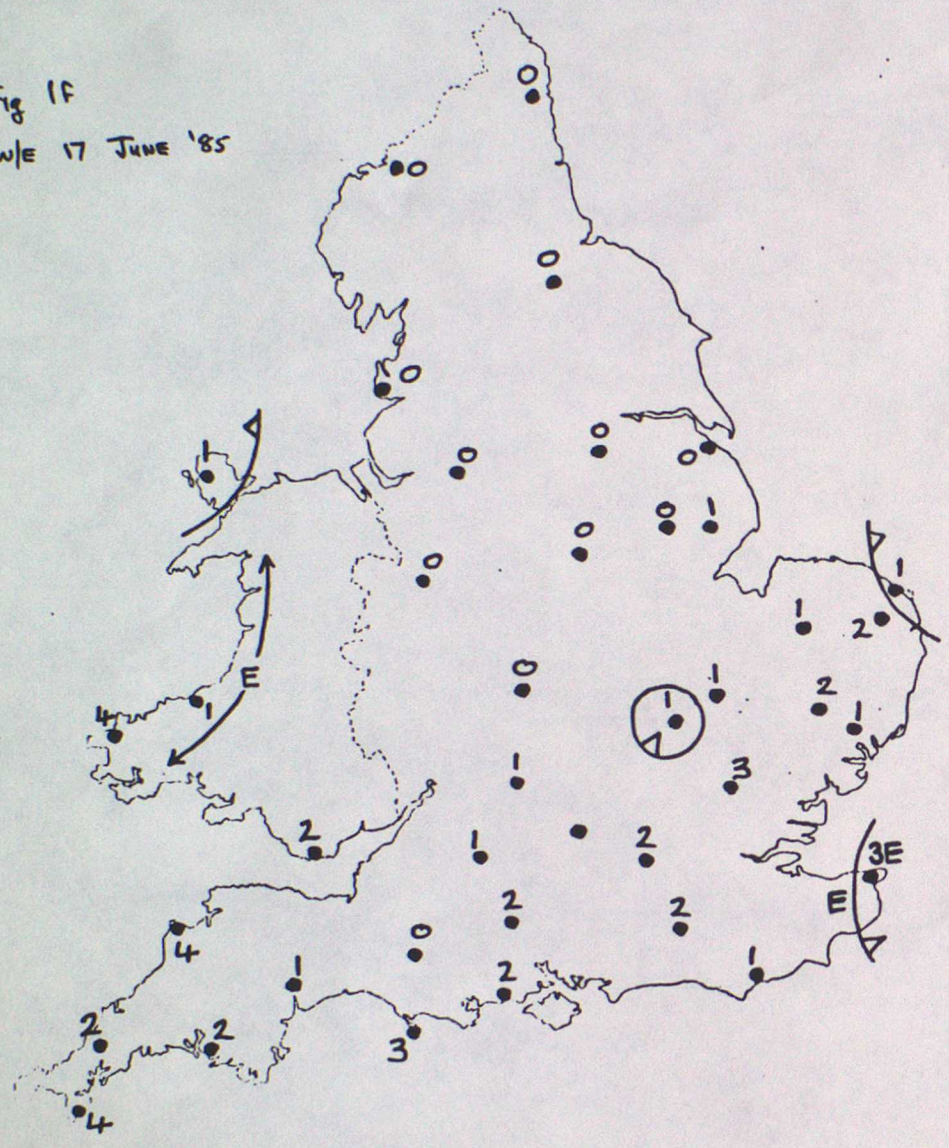

Fig 1g
W/E 24 June '85

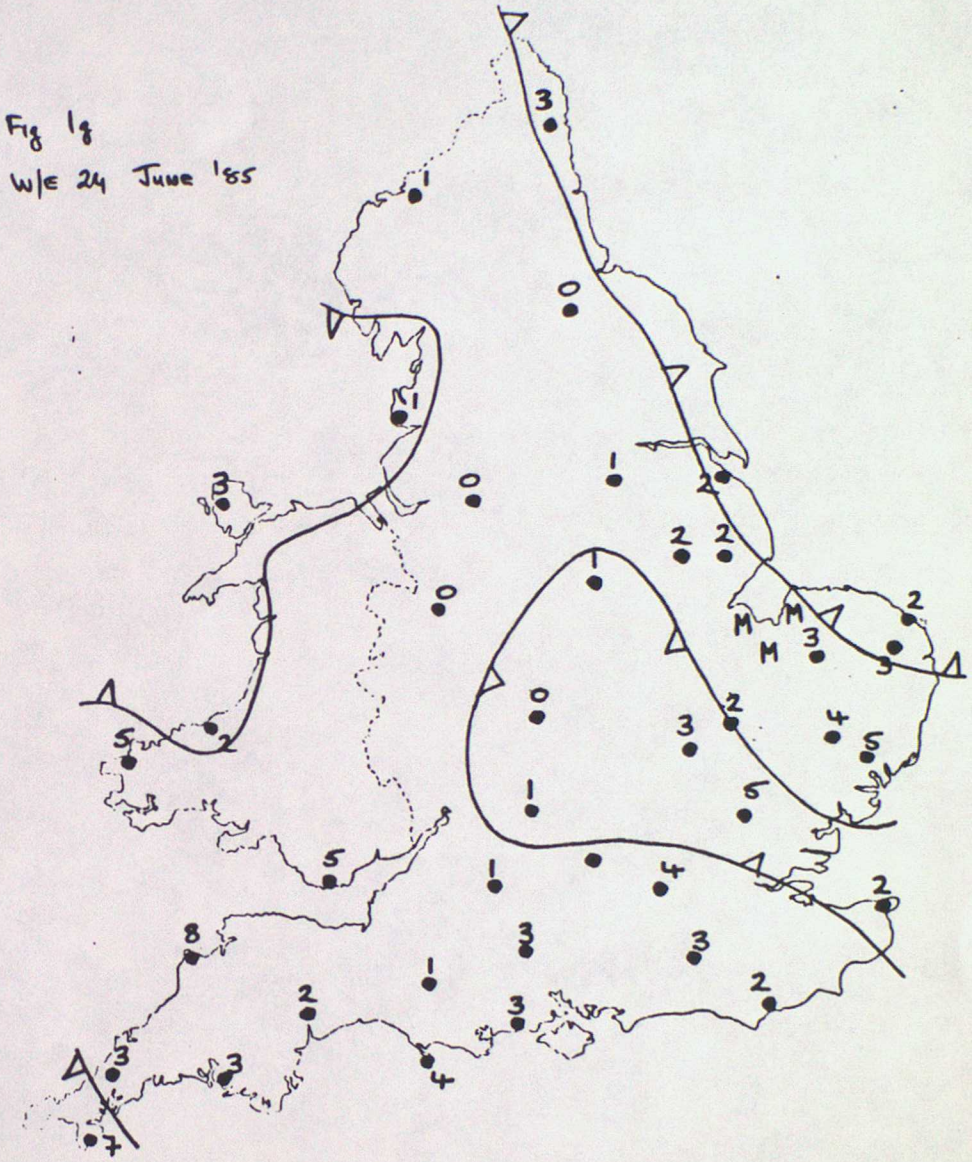

Fig 1k
w/e 1 July '85

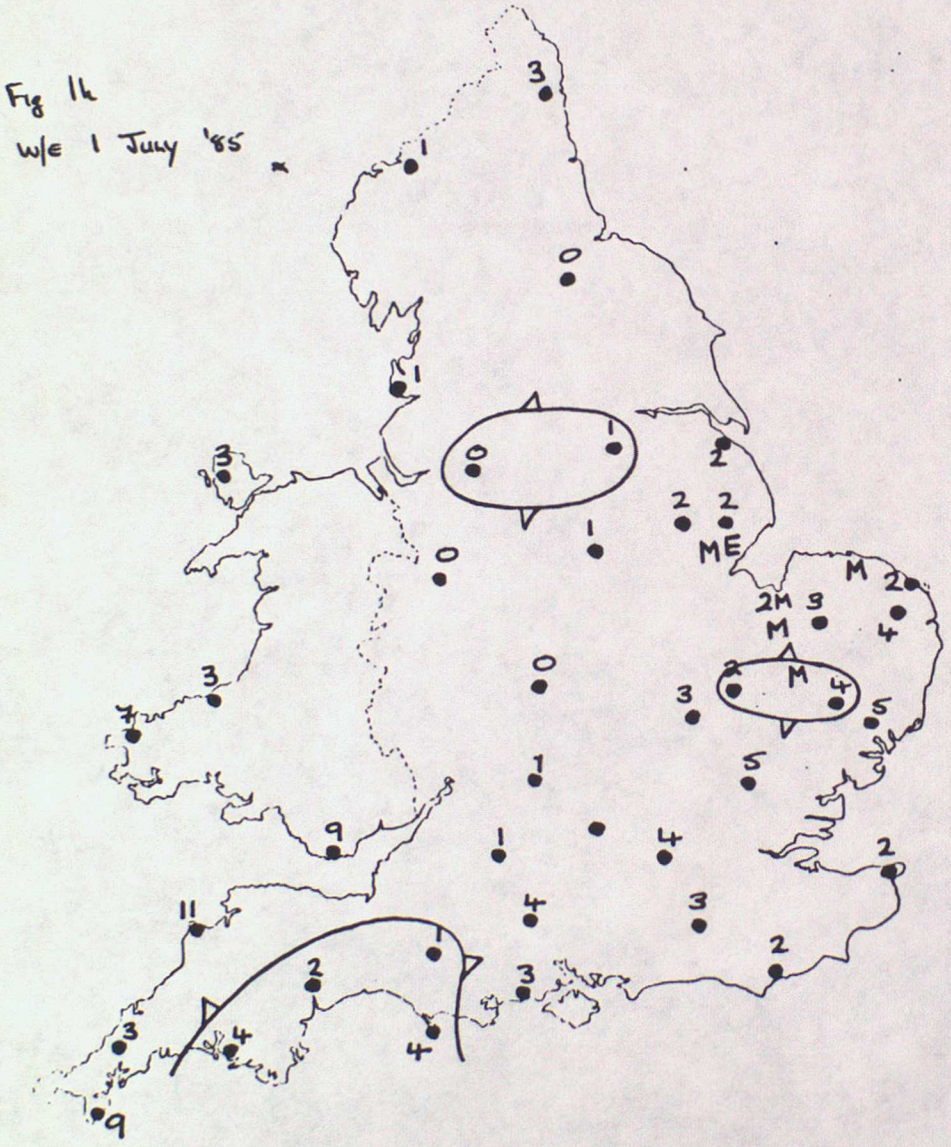

Fig 1i
w/e 8 July '85

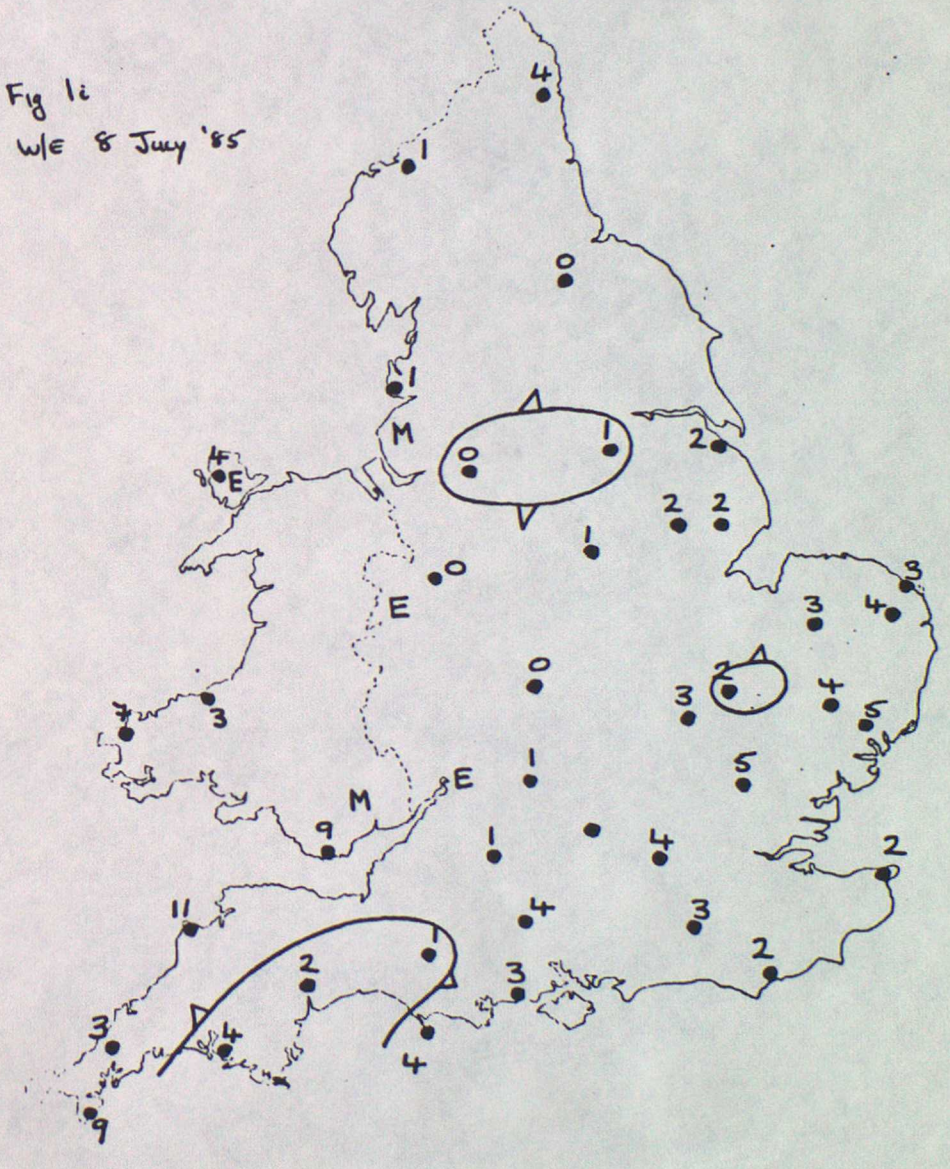

Fig 1j
w/e 15 July '85

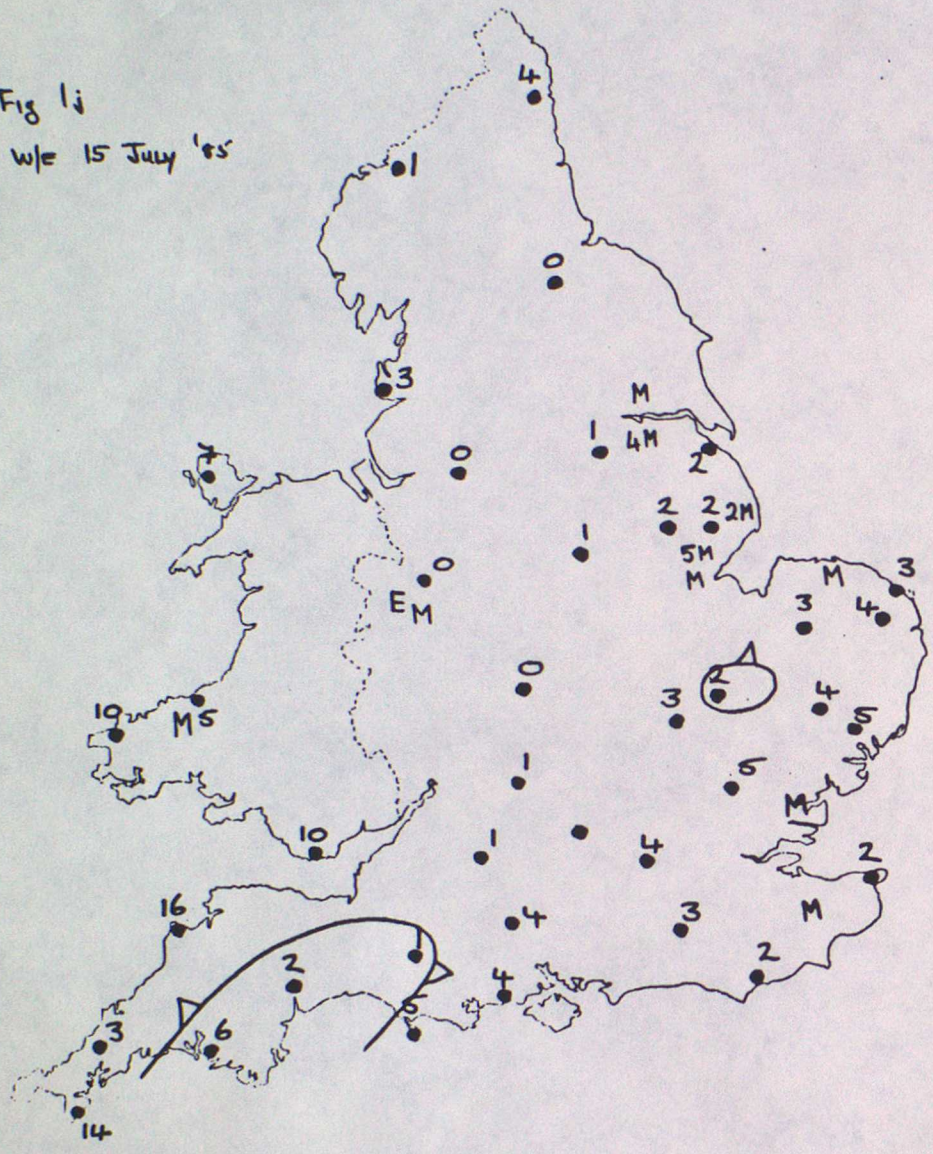

Fig 1k
w/e 22 July '85